Idaho National Engineering and Environmental Laboratory

INEEL/EXT-2000-00187

Revision 1
June 2000

Statement of Work for FY-00 Well Drilling Activities at Test Area North, Waste Area Group 1, Operable Unit 1-07B

BECHTEL BWXT IDAHO, LLC

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ACRONYMS

ASTM	American Standards for Testing and Materials
ASTU	Air Stripper Treatment Unit
BBWI	Bechtel BWXT Idaho, LLC
bls	below land surface
CFR	Code of Federal Regulations
DCE	trans-1,2-dichloroethene
DOT	U.S. Department of Transportation
FY	fiscal year
INEEL	Idaho National Engineering and Environmental Laboratory
LP	liquid propane
MCP	management control procedure
NFC	National Fire Code
NFPA	National Fire Protection Association
NLCID	no-longer contained-in determination
PCE	tetrachloroethene
OU	operable unit
SOW	statement of work
TAN	Test Area North
TCE	trichloroethylene
TSF	Technical Support Facility
USGS	U.S. Geological Survey
VOC	volatile organic compound
WRRTF	Water Reactor Research Test Facility

Statement of Work for FY-00 Well Drilling Activities at Test Area North, Waste Area Group 1, Operable Unit 1-07B

1. INTRODUCTION

This statement of work (SOW) identifies required subcontractor services for well installation and completion of four wells at Test Area North (TAN), Operable Unit (OU) 1-07B at the Idaho National Engineering and Environmental Laboratory (INEEL). The wells are identified as TAN-53, TAN-54, TAN-55, and TAN-56. This work is being performed as part of groundwater remediation activities in the vicinity of the TAN Technical Support Facility (TSF)-05 Injection Well.

1.1 Site Location

The locations of the proposed wells are shown in Figure 1-1. Well TAN-53 (MZIW) will be drilled approximately 15 m (50 ft) east of the TAN Fire Station. Well TAN-54 (PNA-3) will be drilled approximately 229 m (750 ft) south of Highway 33. Well TAN-55 (PNA-5) will be drilled approximately 46 m (150 ft) south of Highway 33. Well TAN-56 (PNA-1) will be drilled approximately 457 m (1,500 ft) south of the Water Reactor Research Test Facility (WRRTF). Bechtel BWXT Idaho, LLC, herein known as the Contractor, will identify the precise locations for drilling these wells to the subcontractor at the pre-bid meeting site walk-down.

1.2 Site Background

The geology beneath TAN is characterized by basalt flows intercalated with sedimentary interbeds. Basalt flows are highly variable, from dense to highly vesicular and from massive to highly fractured. Sedimentary interbeds vary in thickness, with a median thickness of about 1.2 m (4 ft), generally thinner than interbeds found elsewhere on the INEEL. The two main interbeds, P-Q and Q-R, consist primarily of silt and clay. The P-Q interbed dips to the south such that the depth to the interbed varies from about 58 m (190 ft) below land surface (bls) near TSF-05, to about 104 m (340 ft) bls at well TAN-24a. The P-Q interbed is laterally extensive, but not continuous, and is only encountered in about half of the wells that are drilled to a depth where it would be expected. Depth to the Q-R interbed ranges from about 137 to 143 m (450 to 470 ft) bls, with a thickness of about 2.6 m (12 ft). The Q-R interbed appears to be laterally continuous in the area surrounding TAN and effectively confines contaminants within the aquifer. A more detailed description of the geology, hydrogeology, and groundwater contamination at TAN is found in the TAN Site Conceptual Model Reports (Sorenson et al. 1996, Bukowski and Sorenson 1997, and Bukowski et al. 1998).

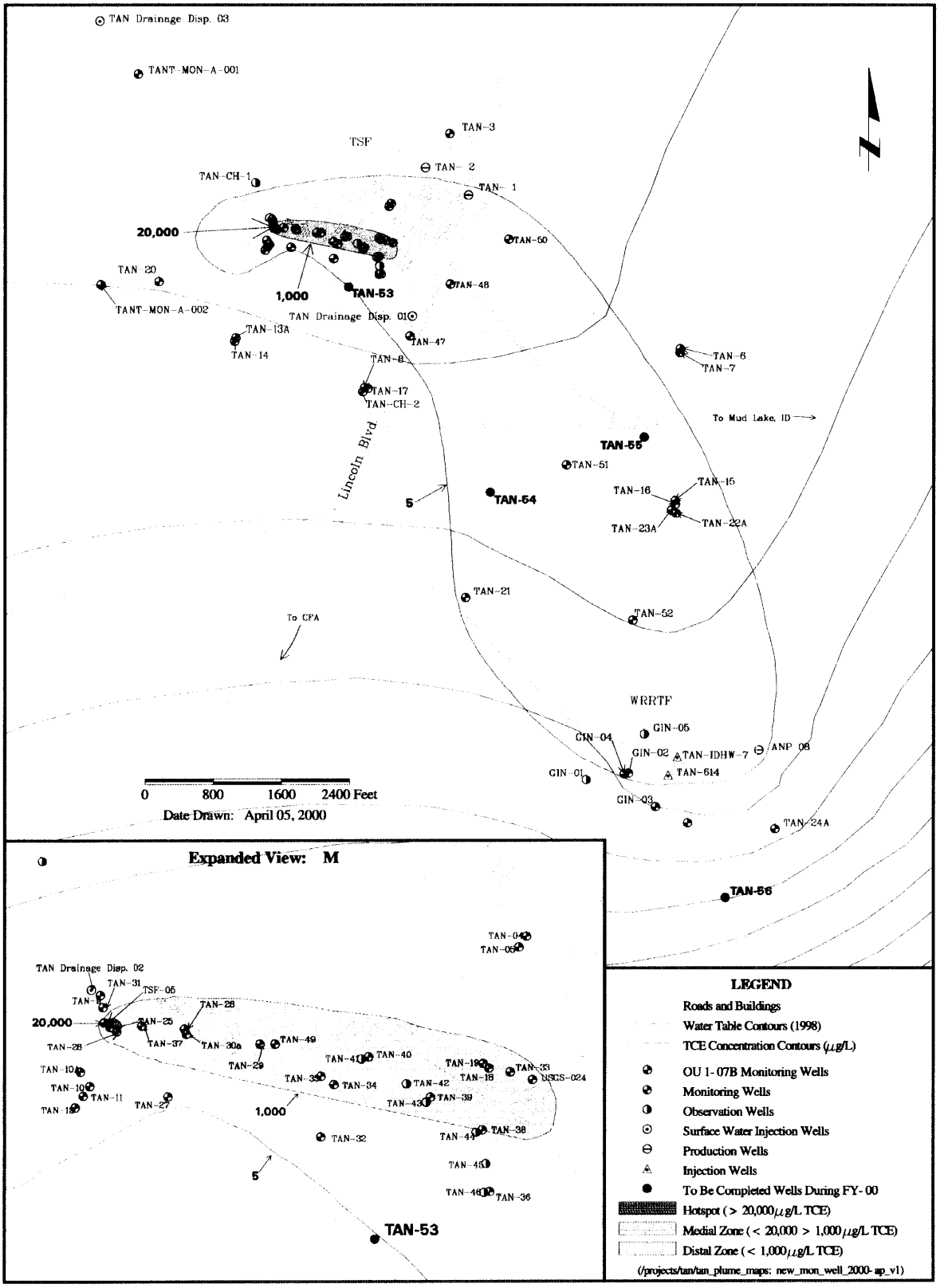

Figure 1-1. Proposed well locations.

2. SCOPE OF WORK

The purpose of this SOW is to: (1) define the location and completion of four new wells to be drilled during fiscal year (FY) 2000, (2) specify the materials, labor, equipment, and supervision necessary to perform the tasks outlined herein, and (3) to define performance specifications for acceptable well completion. Drilling activities for this project are scheduled to begin in May 2000.

2.1 Drilling Sampling and Installation Activities

Wells TAN-53 through TAN-56 are to be drilled and completed according to Table 2-1. Drilling at each well location will terminate on contact with the Q-R interbed, as determined by the Contractor in the field. All wells will be cased to just above the water table approximately 56- to 64-m (200- to 210-ft) bls, with an open borehole below that depth as shown in Figures 2-1 and 2-2. Well TAN-53 will be used as an injection well for treated water from the Pump and Treatment Facility. Therefore, it will also be completed with a water injection line installed to approximately 64-m (215-ft) bls. After water is produced, groundwater samples will be collected at each well. Lab analysis of the water samples must be returned before drilling activities will continue. Sediment cores will be collected from the P-Q interbed at each well if encountered, and analyzed for physical properties.

The Subcontractor is responsible for providing the labor, materials, equipment, and supervision necessary to perform the following activities unless otherwise stated.

Table 2-1. Well construction summary.

Well Name	Hole Diameter (in.)	Hole Depth (ft)	Casing interval (ft)	Casing Diameter (in.)
TAN-53	24	0-50	+3-50	20
	18	50-210	+2-210	14
	18	210–435	Open Hole	NA
TAN-54	20	0-50	+3-50	16
	14 3/4	50-210	+2-210	10
	9 7/8	210–470	Open Hole	NA
TAN-55	20	0-50	+3-50	16
	14 3/4	50-210	+2-210	10
	9 7/8	210–470	Open Hole	NA
TAN-56	20	0-50	+3-50	16
	14 3/4	50-210	+2-210	10
	9 7/8	210-490	Open Hole	NA

Hole depths are approximate. Total depth will be dependent on depth to the Q-R interbed, and will be determined by the Contractor in the field.

Surface casing depth must be at least 1.5 m (5 ft) into competent basalt, but not less than 5.6 m (20 ft) bls.

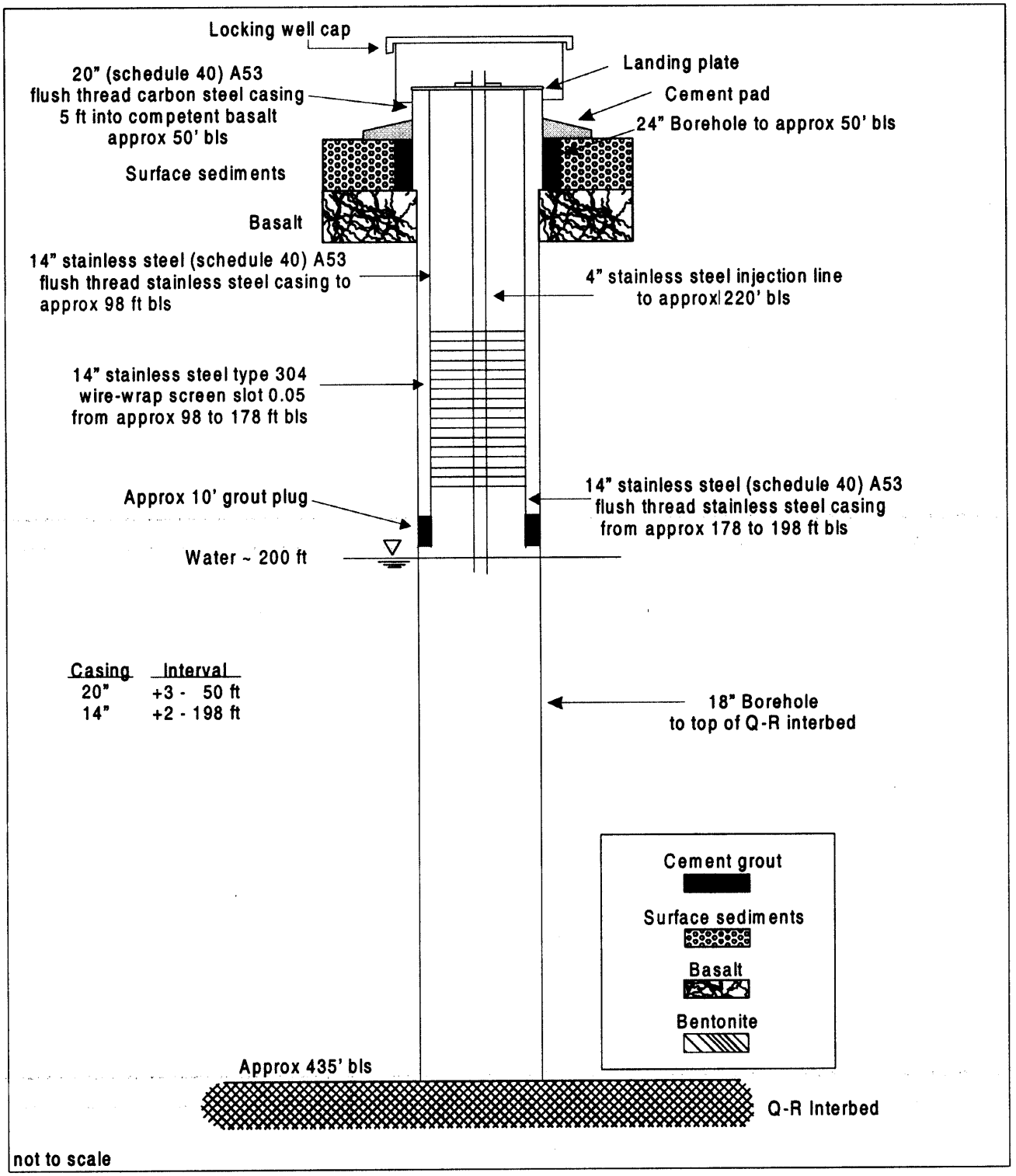

Figure 2-1. Conceptual well design for TAN-53.

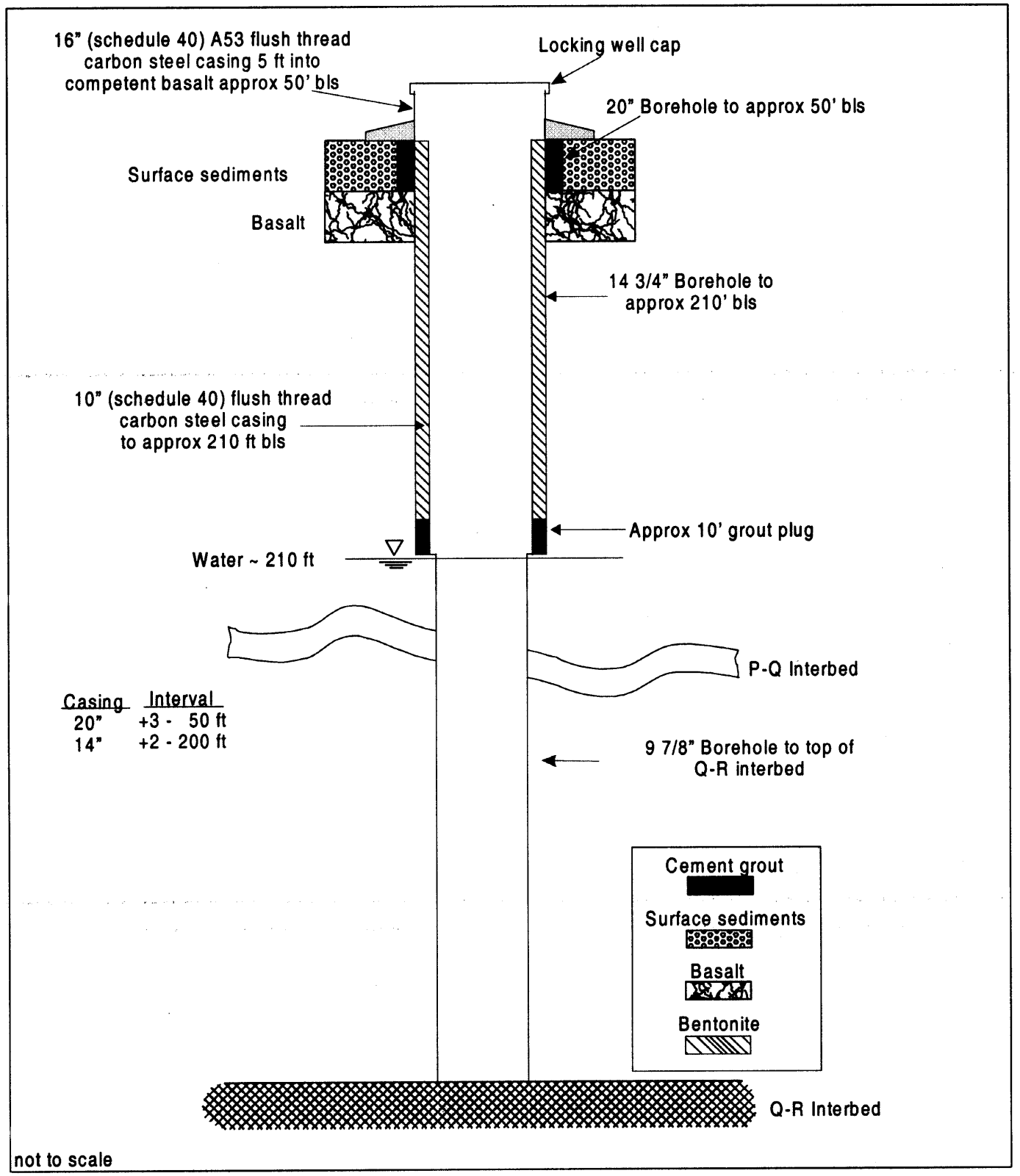

Figure 2-2. Conceptual well design for TAN-54, TAN-55, and TAN-56.

2.1.1 TAN-53

At TAN-53, the expected depth of the P-Q interbed is at the interface of the water table, but its position either above or below the water will be determined in the field. Therefore, as drilling depth approaches the depth of the water table (approximately 64-m [200-ft] bls), the position of the interbed will dictate the sequence of events that must be followed.

1. Using reverse circulation drilling techniques with a down-hole hammer and button bit and 17.8-cm (7-in.) drill rods, drill a 61-cm (24-in.) diameter borehole in the alluvial sediments from the land surface to a depth of at least 1.5 m (5 ft) into competent basalt (approximately 15 m [50 ft], but not less than 6.6 m [20 ft]), and install 50.8-cm (20-in.), flush joint (Schedule 40) carbon steel casing (American Standards for Testing and Materials [ASTM] A53) provided by the Subcontractor. The 17.8-cm (7-in.) drill rods will be used through the entire depth of the borehole in accordance with the guidelines outlined in Appendix 10.A-3 of *Groundwater and Wells* (Driscoll 1986). Samples of the drill cuttings will be collected for lithologic information at a 1.5-m (5-ft) interval during all well drilling activities. The Subcontractor shall assist the Contractor in collecting drill cutting samples.

2. Grout the 50.8-cm (20-in.) casing in place by filling the annulus between the casing and the rock formation with a grout mixture. This mixture shall consist of Type I Portland cement, 5% granular sodium bentonite, and 26 to 34 L (7 to 9 gal) of water per 43-kg (94-lb) bag of cement. Grout shall be allowed to cure for a minimum of 12 hours before further drilling of the borehole will continue. The Subcontractor will be compensated at a Standby Secured rate for grout curing time. Grout, bentonite, or any other annular fill material will be installed using a tremmie pipe unless otherwise specified.

3. Following installation of the 50.8-cm (20-in.) casing, advance a 45.7-cm (18-in.) diameter borehole to a depth of 56-m (200-ft) bls, approximately 1.5 m (5 ft) above the P-Q interbed. During the drilling process (from the ground surface to 56-m [200-ft] bls) the Subcontractor shall exhaust drill cuttings to the ground. At the direction of the Contractor, the subcontractor shall inject controlled amounts of water at the drill cutting discharge point for dust suppression. The injected water needed for dust suppression will be obtained, by the subcontractor, from the TAN Fire Station.

4. Upon reaching a depth of approximately 56-m (200-ft), the Subcontractor shall install containment devices to capture groundwater and drill cuttings as discussed in Section 2.2. With containment devices in place, convert the drill setup to accommodate coring with a PQ size corebit, and core the basalt to the top of the P-Q interbed. When the P-Q interbed is encountered, the coring setup shall be converted to a Longyear Punchcore™, or a Layne/Christensen Geobarrel™ coring system to core through the interbed. Lexan liners will be used to capture interbed sediments collected while coring. At the base of the interbed, convert back to the drilling setup and advance a 45.7-cm (18-in.) borehole until water is produced.

   Note: *If the interbed is not encountered within 6.1 m (20 ft) after coring has begun, remove core rods from the hole, ream the cored section with the 48-cm (18-in.) diameter drill bit to approximately 64-m (210-ft) bls.*

5. When groundwater is produced, follow the procedure for collecting water samples described in Section 2.2.2. When drilling operations are allowed to continue, the subcontractor will

continue advancing a 45.7-cm (18-in.) diameter borehole to the top of the Q-R interbed (approximately 132.6-m [435-ft] bls) where drilling will cease.

6. After reaching total depth, excess drill cuttings shall be cleaned from the borehole by the subcontractor. The well shall be developed until drill cuttings and fine sediments are removed, and water visibly clears, to the Contractors approval. Well cleaning/development will be accomplished with the drill rig, by blowing air into the hole to lift the cuttings and water from the borehole. Well bores shall not be over drilled to accommodate excess drill cuttings. The subcontractor will be reimbursed at the Rig Directed rate for all borehole cleaning/development activities.

7. Upon completion of well development activities, geophysical borehole logging will be completed by the U.S. Geological Survey (USGS). The drill string shall remain in the borehole until logging activities have been completed so that logging tools may be run within the drill string. Geophysical logs to be run will include a neutron log, and a gamma-gamma log. Upon completion of the neutron, and gamma-gamma logging, the drill rods will be removed from the borehole, and natural gamma, caliper, deviation, and video logs will be run in the open borehole. Logging may take up to 5 hours to complete. The subcontractor will be compensated for geophysical logging operations at a Working Ready Standby rate.

8. Following completion of geophysical logging, a 35.6-cm (14-in.) stainless steel casing and screen will be installed through the unsaturated zone as follows:

   - Flush joint, (Schedule 40) (ASTM A53) casing from 54.3- to 60.4-m (178- to 198-ft) bls, with a grout basket installed near the bottom (approximately 60-m [197-ft] bls)

   - Flush joint, Type 304 wire wrap screen with 0.05 slot, from 30-m (98-ft) bls to 54.3-m (178 ft) bls

   - Flush joint, (Schedule 40) (ASTM A53) casing from 0.6-m (2-ft) above ground to 30-m (98-ft) bls.

   The purpose of the screen in the unsaturated zone is to provide hydraulic communication between the formation and water that may mound during subsequent well injection. The casing will be welded to a landing plate and hung from the surface casing.

9. Upon completion of the well, the subcontractor shall install a locking well cap on the surface casing.

10. Boreholes must no deviate more than 3 degrees from the vertical. Any borehole exceeding the 3-degree deviation will be abandoned in accordance with state requirements and MCP-226. If because of negligence or carelessness on the part of the subcontractor, a borehole has to be abandoned before it is completed to the specification herein, the subcontractor will not be paid for the abandoned borehole, and all costs associated with well abandonment will be covered by the subcontractor. The subcontractor will then drill a new borehole nearby according to the specifications in this SOW.

2.1.2 TAN-54, TAN-55, and TAN-56

1. Using reverse circulation drilling techniques with a downhole hammer, a button bit, and 17.8-cm (7-in.) drill rods, drill a 50.8-cm (20-in.) diameter borehole in the alluvial sediments

from the land surface to a depth of at least 1.5 m (5 ft) into competent basalt (approximately 15 m [50 ft], but not less than 6.6 m [20 ft]). Then install 40.6-cm (16-in.) flush joint (Schedule 40) carbon steel casing (ASTM A53) provided by the subcontractor. The 17.8-cm (7-in.) drill rods will be used through the entire depth of the borehole in accordance with the guidelines outlined in Appendix 10.A-3 of *Groundwater and Wells* (Driscoll 1986). Samples of the drill cuttings will be collected for lithologic information at a 1.5-m (5-ft) interval during all well drilling activities. The subcontractor shall assist the Contractor in collecting drill cutting samples.

2. Grout the 40.6-cm (16-in.) casing in place by filling the annulus between the casing and the rock formation with a grout mixture. This mixture shall consist of Type I Portland cement, 5% granular sodium bentonite, and 26 to 34 L (7 to 9 gal) of water per 43-kg (94-lb) bag of cement. Grout shall be allowed to cure for a minimum of 12 hours before further drilling of the borehole will continue. The subcontractor will be compensated for grout curing time at a Standby Secured rate. Grout and any other annular fill material will be installed using a tremmie pipe, unless otherwise specified.

3. Drill a 37.5-cm (14 3/4-in.) diameter borehole to just above the water table (approximately 64-m [210-ft] bls). During the drilling process (from the ground surface to the water table) the subcontractor shall exhaust drill cuttings to the ground. At the direction of the Contractor, the subcontractor shall inject controlled amounts of water at the drill cutting discharge point for dust suppression. The injected water needed for dust suppression will be obtained by the subcontractor from the TAN Fire Station.

4. Upon reaching a depth of 64-m (210-ft) bls, the drill string will be tripped from the borehole to allow for geophysical logging of the borehole by the USGS. Geophysical logs that will be run include caliper log, natural gamma log, deviation log, and video log. Logging may take up to 3 hours to complete. The subcontractor will be compensated during geophysical logging operations at a Working Ready Standby rate.

5. Following logging activities, install 25.4-cm (10-in.) flush joint, (Schedule 40) carbon steel casing (ASTM A53) provided by the subcontractor. Seal the 25.4-cm (10-in.) steel casing in place by filling the annulus between the casing and the rock formation with Number 8 sodium bentonite crumbles.

6. Upon drilling to a depth of approximately 64 m (210 ft) bls, the subcontractor shall install groundwater containment devices described in Section 2.2.1. Following installation of the containment devices, a 25-cm (9 7/8-in.) diameter borehole shall be advanced until water is produced. When groundwater is produced, samples will be collected as described in Section 2.2.2, to ensure that no-longer contained-in determination (NLCID) requirements are satisfied. When drilling operations are allowed to proceed, the subcontractor will continue advancing a 25-cm (9 7/8-in.) diameter borehole until reaching a target depth, as determined by the Contractor, approximately 1.5-m (5-ft) above the estimated depth of the P-Q interbed (approximately 77.7-m [255-ft] bls for TAN-54 and TAN-55 and approximately 112.7-m [370-ft] bls for TAN-56).

7. Upon reaching the target depth, drilling will cease, and the drilling operation will be converted to accommodate coring operations using a PQ size corebit. All cuttings and groundwater generated during the coring process will be diverted to a small holding tank separate from the frac-tank already in place. In addition to the holding tank, additional containment devices, discussed in Section 2.2.3, will be installed prior to beginning the coring process. The basalt immediately above the interbed shall be cored until the top of the

P-Q interbed is encountered. Because the P-Q interbed is not laterally continuous, it may not be present in all wells; therefore, basalt coring will cease and drilling will resume if the P-Q interbed is not encountered within 6.1 m (20 ft) of the start depth. When the interbed is encountered, the coring setup shall be converted to a Longyear Punchcore™, or Layne/Christensen Geobarrel™ coring system to core through the interbed. Lexan liners will be used to contain interbed sediments collected while coring. At the base of the P-Q interbed, coring will cease, and drilling will resume to advance a 25-cm (9 7/8-in.) diameter borehole to the top of the Q-R interbed (approximately 140-m [470-ft] bls for TAN-54 and TAN-55 and approximately 149-m [490-ft] bls for TAN-56). Drilling will cease when the top of the Q-R interbed is encountered.

8. Upon drilling a 25-cm (9 7/8-in.) diameter borehole to total depth, geophysical borehole logging may be completed by the USGS. The drill string shall remain in the borehole until logging activities have been completed so that logging tools may be run within the drill string. Geophysical logs that will be run include a neutron log, a gamma-gamma log, a natural gamma log, and a deviation log. Logging may take up to 5 hours to complete. The subcontractor will be compensated for geophysical logging at the Working Ready Standby rate.

9. At the completion of drilling activities, well development will be conducted according to the procedures specified in Section 2.4 and the miscellaneous drilling information presented in Paragraph 4.

10. Upon completion of the well, the subcontractor shall install a locking well cap on the surface casing as shown in Figure 2-3.

11. Boreholes must not deviate more than 3 degrees from the vertical. Any borehole exceeding the 3-degree deviation will be abandoned in accordance with state requirements and Management Control Procedure (MCP)-226 "Well Construction/Well Abandonment." If because of negligence or carelessness on the part of the subcontractor, a borehole has to be abandoned before it is completed to the specification herein, the subcontractor will not be paid for the abandoned borehole, and all costs associated with well abandonment will be covered by the subcontractor. The subcontractor will then drill a new borehole nearby according to the specifications in this SOW.

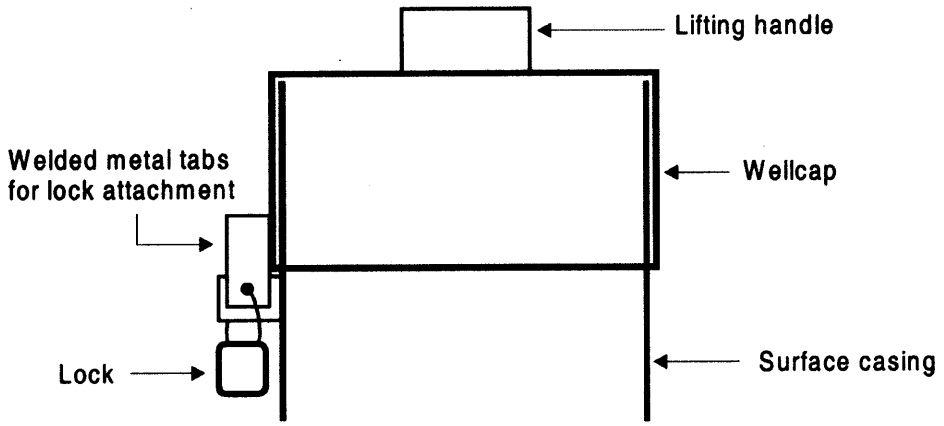

Figure 2-3. Locked well cap for Wells TAN-54, TAN-55, and TAN-56.

2.2 No-Longer Contained-In Determination Sampling and Containment

2.2.1 Drilling Containment Devices

Through past operating procedures at TAN, the aquifer beneath TAN was contaminated with volatile organic compounds (VOCs), trichlorocthylene (TCE), cis and trans-1,2-dichloroethene (DCE), tetrachloroethene (PCE), and vinyl chloride, and has been classified as F001-listed waste. Because of the listed waste classification, water samples will be collected by the Contractor to determine the cumulative concentration of VOCs in the water reaching the surface. Therefore, before encountering the water table at a depth of approximately 56- to 64-m (200- to 210-ft) bls, the subcontractor shall install devices on the drill rig that will capture drill cuttings and groundwater and divert it to a holding tank(s) (frac-tank). The subcontractor shall provide holding tank(s) of adequate size (approximately 22,712 L [6,000 gal]) for accommodating all drill cuttings and groundwater, and all equipment necessary for moving the tank between well sites. To minimize soil disturbance, the holding tank shall not be dragged between sites. The subcontractor shall also furnish and install a temporary containment device at the well head and diverter devices that will prevent groundwater produced by the drilling operation from reaching the ground surface.

2.2.2 Sample Collection

When groundwater is produced, the subcontractor shall immediately notify the Contractor. Borehole penetration will cease, but the subcontractor shall continue producing water into the holding tank for approximately 10 minutes. After 10 minutes of continuous water production, the Contractor will collect two water samples for NLCID. Upon collection of the water samples, the subcontractor will shut down operations and go to a Standby Secured status until notified by the Contractor to resume work activities. Standby Secured status will remain in effect until sample analysis results are returned. Lab results will generally be returned within 1 working day, but may require up to 2 days. The Contractor, as

a result of the sample analysis, may determine that the drilling operation will require the construction of a drill rig containment pad, to capture leaking groundwater resulting from drilling operations. Containment pad construction may require 2 to 3 days to complete. The subcontractor will be compensated for containment pad construction activities at the Standby Secured rate. In addition, the subcontractor may be required to install plastic sleeves on the air hoses from the well head and the rig top head. If this should occur, the subcontractor will be directed to remove the drill string from the borehole and mobilize equipment out of the drilling area. The Rig Directed rate will be paid for removing the drill string, mobilizing the rig off the borehole, and installing plastic sleeves on the air hoses. Following removal of the drill string and rig, the subcontractor shall go to a Standby Secured status, while the Contractor constructs the containment pad. Upon completion of the containment pad, the Contractor will direct the subcontractor when drilling operations may continue.

Note: *All drilling techniques and components (e.g., rate of air flow, drill string assembly) that were used during the water sampling process must be used and replicated during the subsequent well drilling in the saturated zone, except while coring. Additional containment requirements, discussed below, will be necessary during the coring process.*

2.2.3 Coring Containment Devices

Because coring activities will not operate under the same air flow conditions as that of drilling activities, any coring that occurs below the water table, approximately 56- to 64-m (200- to 210-ft) bls, will require the construction of a core collection area to contain any water and sediment that may come from the core. The subcontractor shall install plastic sleeves (if not already in place) on the air hoses from the well head and drill head. All working surfaces (tables and sawhorses) that may contact the core will be wrapped in plastic to prevent water and sediment from contacting the surface. All work on the core (cutting samples from the core, capping and sealing the Lexan liners, etc.) will be completed within the containment area. In addition, the subcontractor shall supply a small holding tank (approximately 1,892 L [500 gal]) (separate from the frac-tank already in place) to contain any water generated during the coring process. Hoses from the well head and the drill head will be discharged into this tank. The Contractor will provide means for removing the water from the tank and transporting it to the Air Stripper Treatment Unit (ASTU) for dispositioning and decontamination of the tank.

2.3 Well Construction Materials

The subcontractor will furnish the following well casing and well completion accessories for each well as a minimum. The subcontractor shall furnish catalog cuts/product data as vendor data for each of the following:

- A sufficient quantity of 40.6-cm (16-in.) flush-joint, Type A53 (Schedule 40) carbon steel casing
- A sufficient quantity of 25.4-cm (10-in.) flush-joint, Type A53 (Schedule 40) carbon steel casing
- A sufficient quantity of 50.8-cm (20-in.) flush-joint, Type A53 (Schedule 40) carbon steel casing
- 110 ft of 35.6 cm (14 in) Type 304 (schedule in stainless steel casing)
- 90 ft of 35.6 cm (14 in) Type 304 wire wrap stainless steel screen with 0.05 slot

- One 35.6-cm (14-in.) cement basket
- A sufficient quantity of 23-kg (50-lb) bags of Number 8 granular sodium bentonite with a bulk density of at least 36 kg/ft^3 (80 lb/ft^3)
- A sufficient quantity of Type I Portland cement the subcontractor will provide, in 43-kg (94-lb) bags and/or by premixed cement batches delivered to the site via cement trucks, depending on the quantity required
- A sufficient quantity of flush coupled, rigid-galvanized steel tremie pipe, or equivalent
- Sufficient quantity of Lexan liners to contain PQ size core.

Note: *For 25.4-cm (10-in.) carbon steel casing, 6-m (20-ft) sections may be used. However, at least one 3-m (10-ft) section of carbon steel casing should be supplied for each well. The 25.4-cm (10-in.) nominal carbon steel well casing must be factory precleaned (steam cleaned).*

2.4 Miscellaneous Drilling information

1. The subcontractor shall minimize the area that is disturbed by drilling operations. Traffic to and from the drill site shall remain on the two-track access road.
2. Drilling mixtures, other than air or air/water, will not be used during drilling of the well.
3. All downhole drilling equipment will be cleaned using a steam cleaner on a decontamination pad that will be provided by the subcontractor prior to initiating any drilling. All downhole equipment may also be decontaminated at the completion of each well, and will be decontaminated prior to demobilization from the site as determined by the Contractor. The location of the decontamination pad shall be determined by the Contractor. Downhole equipment (drill rods and bits, etc.) will be decontaminated over the subcontractor installed decontamination pad in order to remove potential contamination. Decontamination activities will proceed in accordance with the procedures described in the interim decontamination plan for OU 1-07B (INEEL 1999).
4. After reaching total depth, excess drill cuttings shall be cleaned from the borehole by the Subcontractor. The well shall be developed until drill cuttings and fine sediments are removed, and water visibly clears, to the Contractors approval. Well bores shall not be over drilled to accommodate excess drill cuttings. The subcontractor will be reimbursed at the Rig Directed rate for all borehole cleaning/development activities. Wells shall be completed in accordance with MCP-226, "Well Construction/Well Abandonment."

2.5 Grouting

1. All grout (supplied by the subcontractor), except abandonment or lost circulation grout, shall be a grout mixture of Type I cement, 5% granular sodium bentonite, and 26 to 34 L (7 to 9 gal) of water per 43-kg (94-lb) bag of cement. A maximum of 1:1 ratio of sand or pea gravel (supplied by the subcontractor) to cement may be added to the grout mixture to reduce grout loss.

2. Abandonment and lost circulation grout (supplied by the subcontractor) may consist of approximately 50% Type II Portland cement; 2% granular bentonite (2% by weight relative to the dry cement, approximately 0.9-kg [2-lb] of bentonite per 43-kg [94-lb] sack of cement); and approximately 48% sand. Curing accelerators (e.g., CaCl) may be added.

2.6 Well Site Completion

Well site completion (protective casing, well head, well pad, impingement posts, brass marker) will be the responsibility of the Contractor. The subcontractor shall be responsible for drill site cleanup. Cleanup activities include, as a minimum, the following: smooth out ruts from drilling activities, smooth out (aboveground) drill cuttings, removing all drilling equipment and materials from the drill site, removing all related barricades and fencing materials, and restoring the site as it was prior to drilling.

Note: *The Contractor shall be responsible for reseeding the drill site area.*

3. VENDOR DATA AND MISCELLANEOUS SUBCONTRACTOR EQUIPMENT REQUIREMENTS

3.1 Vendor Data Submittal

The contractor will require vendor data submittal for approval of the following items:

- Description of dust suppression methods.
- Temporary containment device at the well head, and diverter devices that will prevent groundwater produced by the drilling operation from reaching the ground surface.
- Well completion accessories (catalog cuts/product data) for each of the following:
  - Casing
  - Bentonite
  - Cement
  - Tremmie pipe
  - Cement basket.
- The latest inspection on masts and hoisting tools, load rating charts, and load test certification (must be within 12 months of drilling start date).
- The manufacturer's specifications and recommendations concerning masts, hoists, and other equipment.
- Personnel/operator qualifications—each drilling rig shall have one subcontractor employee onsite with a valid Idaho well driller/supervisors license. In addition, all drill helpers must have a minimum of 1 year of drill helper experience.
- Rig use history (the last 12 months)—the subcontractor shall furnish certification stating that **either** the drilling rigs have not been previously used at a hazardous waste facility or identifying at which hazardous waste sites they have been used, the hazardous constituents to which they were exposed, and the decontamination procedures used following completion of the work.
- Description of drilling techniques for the tasks described in this SOW.

3.2 Equipment Requirements

A short list of subcontractor equipment necessary to perform the tasks discussed in this SOW is provided in this section, and the INEEL requirements of this equipment (it is not intended to be a complete list). In addition to these items, the subcontractor is required to furnish all drilling and maintenance tools, materials, and equipment not herein designated, but normally required for the

operation of drilling activities that are within this SOW. The subcontractor is responsible for ensuring that the materials and equipment used are adequate for the actual conditions encountered. All equipment and materials so described are subject to inspection/rejection by the Contractor. Drill rigs and all down hole tools shall be free of excess dirt and grease upon arrival at TAN. All tools and equipment shall be onsite before startup.

1. Reverse Circulation Air Rotary Rig(s)

   The rig(s) shall be a top truck mounted rig capable of both reverse circulation and conventional drilling. It must be capable of drilling, coring, and installing/removing all materials as described in this SOW. The rig(s) shall be equipped to inject controlled amounts of water during the drilling process. The drill rig shall be equipped with the maximum air filtration system available.

   a. The subcontractor shall perform a thorough inspection of the rig prior to mobilization and prior to use. A verification of documents (i.e., rig inspection records, checklists) for this rig inspection shall be conducted by the Contractor. All deficiencies shall be corrected in accordance with manufacturer specifications, at no cost to the Contractor.

   b. The subcontractor shall notify the Contractor a minimum of 5 working days prior to mobilization. The Contractor reserves the right to inspect the drilling and support equipment at the subcontractor's equipment yard prior to mobilization to the drilling site. If the equipment is located on-Site at the INEEL, a premobilization inspection shall be performed at the INEEL at the Contractor's discretion. The Contractor reserves the right to reject any equipment not in conformance with the subcontract.

   c. Each drilling rig shall have an operator with a valid Idaho well driller's license and driller supervisor valid in the State of Idaho (to be submitted to Contractor as vendor data submittal).

   d. Impermeable tarps or plastic sheeting (Visquene) shall be placed beneath drilling rigs to catch oil and hydraulic fluid leaks. A new plastic tarp will be used for each drilling site. The used tarps will be disposed by the subcontractor, unless otherwise specified.

   e. The drilling rig shall have a secondary air compressor on hand, capable of generating the same air flow as the primary air compressor used during drilling activities.

2. Air Compressors

   All compressors must have in-line oil filters appropriately pressure rated to prevent oil from entering the borehole.

3. Dust Suppression

   The subcontractor shall provide diversion systems to collect and carry cuttings, water, and dust away from the borehole a minimum of 9.14 m (30 ft) (discharge hose, cyclone, and separator, etc.) The subcontractor is responsible for dust control and shall comply with Idaho Administrative Procedures Act 16.01.01251 and 1252. The subcontractor will be responsible for hauling water for dust suppression, as required. The cyclone separator will

require a support device when discharging onto a tarp and mounting hardware for a holding tank when discharging into a tank.

4. Drilling Water Containment

The Contractor will notify the subcontractor that contact with the water table is imminent. Upon receipt of this notification, the subcontractor shall provide a containment device at the well head to capture any water leaking from diverter seals or any other diversion system component and ensure that the groundwater does not reach the ground surface.

5. Fuel Tanks, Heaters, and Pressure Vessels

Any portable fuel tanks must be vented and labeled appropriately in accordance with the National Fire Code (NFC). Fuel tanks must be stored according to the National Fire Protection Association (NFPA) guidelines.

All liquid propane (LP) gas heaters shall be equipped with a device to regulate and cut off the flow of gas during use in case of flame, failure, or rupture. All fuel tanks must be appropriately labeled with their contents and comply to applicable U.S. Department of Transportation (DOT) regulations and 29 Code of Federal Regulations (CFR) 1926.150, prior to arrival onsite.

All pressure vessels must be code stamped certified and be current.

6. Tool Joint Lubricant

No petroleum-based lubricants are permitted during the drilling or completion operations, including petroleum-based hammer and drill pipe (joint) lubricants. Material safety data sheets must be provided by the subcontractor for all potential lubricants according to requirements of GC-7C.3b.ii. Tool and drill pipe (joint) lubricants must consist of inert constituents.

7. High Pressure Steam Cleaner

Steam cleaners will be used to decontaminate equipment and material, as necessary, and will be supplied by the subcontractor.

8. Slow Opening Gate Valves and Hose

The subcontractor shall supply connections for fire hydrant usage. The Contractor shall determine the location of hydrants to utilize.

9. Water Truck

Any equipment that is in violation of the manufacturers specifications or regulatory requirements will be rejected by the Contractor.

4. WORK TO BE PERFORMED BY THE CONTRACTOR

The following work will be performed by the Contractor and is specifically excluded from the subcontractor's SOW:

- Completion of well head and protective casing
- Borehole logging
- Sampling and analysis of cuttings, drilling water, and construction waste
- Installation of concrete surface pad, posts, and survey marker
- Surveying of well, completion diagram, and final report
- Industrial hygienist and radiological control surveillance
- Drill cutting and groundwater disposal
- Construction of secondary containment pad (if necessary)
- Construction of core collection area
- Installation of cement pad and brass marker.

5. GOVERNMENT-FURNISHED EQUIPMENT

Materials and equipment furnished to the subcontractor as government furnished equipment by the Contractor are identified in Schedule X. Any such materials required for use by the subcontractor in performing the work described in the subcontract shall be furnished and delivered to the subcontractor at no cost. All such materials will be made available to the subcontractor at the drill site.

5.1 Schedule X

The Contractor will furnish to the subcontractor, at no cost, the equipment or material listed in Table 5-1. The equipment or material will be supplied to the subcontractor at the time of installation in accordance with the provision of the subcontract. Level D personal protective equipment shall be supplied by the subcontractor and used according to the General and Special Conditions and as specified in the health and safety plan. Respirators shall be furnished by the Contractor for radiological and fugitive dusts, as needed.

Items listed in Table 5-1 will be available only during normal working hours (Monday through Thursday, 7:00-4:30), and a 24-hour minimum advance notice to the Contractor (Saturday, Sundays, and holidays excluded) will be required.

Table 5-1. Government furnished equipment and material.

Item	Quantity	Description	Location	Date Available
1	NA	Respirators	Drill site	As needed
2	NA	Secondary containment for holding tank	Drill site	As needed
3	1 per well	Locking well head cap	Drill site	As needed
4	NA	Secondary containment materials	Drill site	As needed
5	100 ft	14 in. flush joint, stainless steel Type 3-4, Schedule 40 casing	Drill site	May 2000
6	100 ft	14 in. flush joint, wire wrap, stainless steel screen Type 304, with 0.05 slot	Drill site	May 2000

NA = not applicable.

6. REFERENCES

Bukowski, J. M., and K. S. Sorenson, *Site Conceptual Model: 1996 Activities, Data Analysis, and Interpretation Test Area North Operable Unit 1-07B,* INEEL/EXT-97-00556, Revision 0.

Bukowski, J. M., et al., 1998, *Site Conceptual Model: 1997 Activities, Data Analysis, and Interpretation for Test Area North Operable Unit 1-07B,* INEEL/EXT-98-00575, Revision 0.

Driscoll, F. G., 1986, *Groundwater and Wells*, Johnsons Filtration Systems Inc., St. Paul, MN, Appendix 10.A-3, Page 929.

INEEL, 1999, *Interim Decontamination Plan for Operable Unit 1-07B*, Idaho National Engineering and Environmental Laboratory, INEEL/EXT-97-01287, Revision 2.

INEEL, MCP-226, "Well Construction/Well Abandonment," Idaho National Engineering and Environmental Laboratory, current issue.

Sorenson, K. S., A. H. Wylie, and T. R. Wood, 1996, Test Area North Site Conceptual Model and Proposed Hydrogeologic Studies Operable Unit 1-07B, INEEL/96-0105, Revision 0.